

**WHAT IS CLAIMED IS:**

1. A preservation solution for cells, tissues, and organs comprising a combination of polyglycerol and lactose in an amount effective to preserve said cells, tissues, and organs under hypothermic conditions.
- 5 2. The preservation solution of Claim 1 wherein said lactose is alpha lactose.
3. The preservation solution of Claim 1 wherein said polyglycerol is from  $n = 2$  to  $n = 200$  monomers.
4. The preservation solution of Claim 1 wherein said polyglycerol is decaglycerol or hexaglycerol.
- 10 5. The preservation solution of Claim 1 wherein said lactose is at a concentration from 11 mM to 250 mM.
6. The preservation solution of Claim 1 wherein said polyglycerol is at a concentration of 10 mOsm to 250 mOsm.
7. The solution of Claim 1, further comprising chondroitin sulfate.
- 15 8. The solution of Claim 7, wherein the concentration of chondroitin sulfate is on the order of 0.01% w/v to 1% w/v.
9. The solution of Claim 1, further comprising chlorpromazine.
10. The solution of Claim 9, wherein the concentration of chlorpromazine is about 1-50 micrograms/ml.
- 20 11. The solution of Claim 10, wherein the concentration of chlorpromazine is about 2-10 micrograms/ml.
12. The solution of Claim 1, further comprising calcium.
13. The solution of Claim 1, further comprising citrate.
14. The solution of Claim 1, further comprising glutathione.
- 25 15. The solution of Claim 1, further comprising a phosphate buffer.
16. The solution of Claim 1, further comprising glucose.
17. The solution of Claim 1, further comprising adenine.
18. The solution of Claim 1, further comprising magnesium.
19. The solution of Claim 1, wherein the solution has an osmolality of less than about 350 mOsm.
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20. The solution of Claim 1, wherein the sum of all impermeant species contributes 20-250 mOsm (milliosmolal) to the osmolality of the solution.

21. A method for the preservation of cells, tissues, or organs under conditions of impaired cell volume homeostasis, comprising:

5       contacting said cells, tissues, or organs with a solution comprising polyglycerol in an amount effective to preclude or to reverse cell swelling.

22. The method of Claim 21 wherein said contacting is via intravenous or intra-arterial administration.

10       23. The method of Claim 21 wherein said contacting is *in vivo* via arterial organ perfusion or retrograde venous perfusion of an organ or vascularized tissue.

24. The method of Claim 21 wherein said contacting is *in vitro* via arterial organ perfusion or retrograde venous perfusion of an organ or vascularized tissue.

25. The method of Claim 21 wherein said contacting is via the immersion of or bathing of affected cells, tissues, or organs.

15       26. The method of Claim 21 wherein said preservation solution further comprises lactose.

27. The method of Claim 21 wherein said polyglycerol is from  $n=2$  to 200 monomer units in length.

20       28. The method of Claim 21 wherein said polyglycerol is tetraglycerol, hexaglycerol, or decaglycerol.

29. The method of Claim 21 wherein said polyglycerol is at a concentration of from about 20 mOsm to 1,500 mOsm when in contact with said cell, tissue, or organ.

30. The method of Claim 26 wherein said lactose is alpha lactose.

31. The method of Claim 21 wherein said effective amount is an isotonic solution.

25       32. The method of Claim 21 wherein said effective amount is a hypertonic solution.

33. A method for the preservation of cells, tissues, or organs under conditions of impaired cell volume homeostasis, comprising:

contacting said cells, tissues, or organs with a solution comprising lactose in an amount effective to preclude or to reverse cell swelling.

30       34. The method of Claim 33 wherein the lactose is alpha lactose.

35. The method of Claim 33 wherein the lactose is at a concentration from about 11mM to about 250 mM.

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